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March 16th, 2017

The Predictive Science Panel (PSP) met at LANL on 14-16 March 2017. The Panel continues to appreciate the frank and open discussion of the various topics. There were four deep dive sessions:

- NOSE Update
- Measurement, Meaning and Presentation of Uncertainties
- Boost Experiments and Interpretation
- IHE Production

The NOSE Update was impressive for the wealth of new data and the step-up in the confidence that the techniques will return useful data. This suggests that the Lab is ready to design and field experiments that attempt to measure small differences in alpha. Moreover, these experiments should be blind experiments. Static experiments with SNM are encouraged in particular. Continue to refine the photo-fission experiments that have so clearly demonstrated the feasibility of this approach as a neutron source. Extend the analysis timescale over which measurements are made to try to capture more of the short-time signal. Document the impact of the LORD program that helped to get this effort off the ground.

The Panel was pleased with the detailed analysis presented on Uncertainty Quantification and the inclusion of the statistics community. New tools applied to the UGT portfolio are clearly providing improved understanding of performance. In light of the new analysis performed with a Common Model, some historic uncertainties may be too low. We suggest adding additional systems to the set already being used. There appear to be opportunities to adopt some of the findings from recent developments in boost metrics.

Boost metrics were reviewed in detail. The Panel agrees that the separation of effects continues to be a useful approach and is well supported by the analysis. We agree that the results should inform the predictive power of simulations. We gained a better understanding of the physical basis for the metrics, which improves confidence in them. Changes in the shapes of distributions are important because of the impact on predictive power and need further work to substantiate them. The Panel also agrees with the refinement of uncertainties and scientific approaches for upcoming milestones and recommends a continued emphasis on compensating errors and the use of experiments to constrain them.

The Panel was very pleased that the presentation on IHE Production was so forthright. In the short term, the Panel recommends implementation of an engineering model that uses experimental data to adjust, say, an EOS, according to variations in density and homogeneity. Also in the short term, devising engineering specifications that capture the requirements of the STS might help with decisions as to the acceptability of modern IHE. In the long term there are opportunities to apply modern image analysis techniques such as machine vision to assess and quantify homogeneity, for example. The extent to which operator judgment enters the production processes needs attention because this is a well-known source of variability.